TRAINING SERVICE

GM GENERAL MOTORS

GENERAL MOTORS WAR PRODUCTS

PROPER HEADSPACING

CALIBER .50, M2
BROWNING MACHINE GUN

THIS PAMPHLET IS IDENTIFIED AS

FGE

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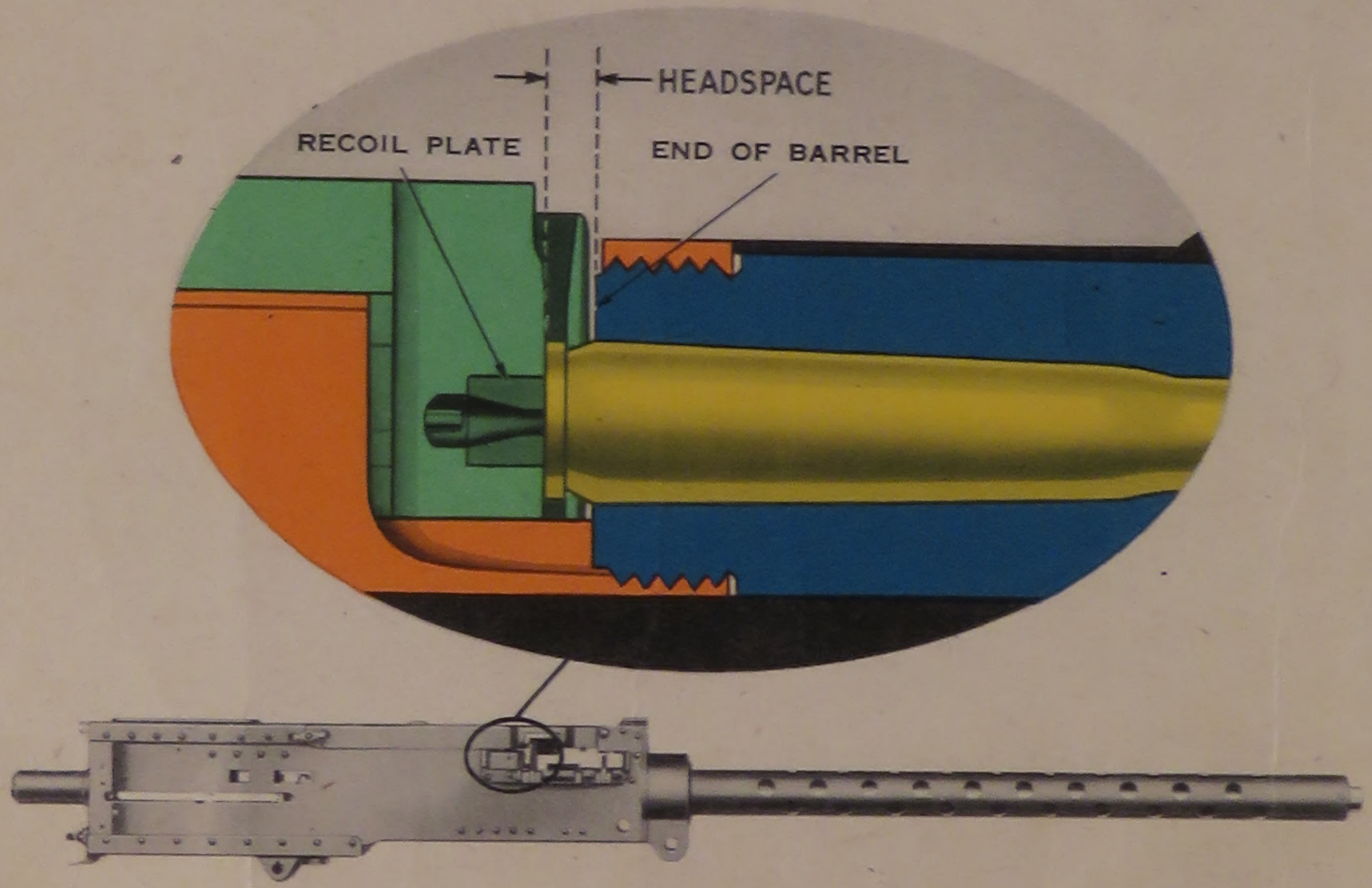
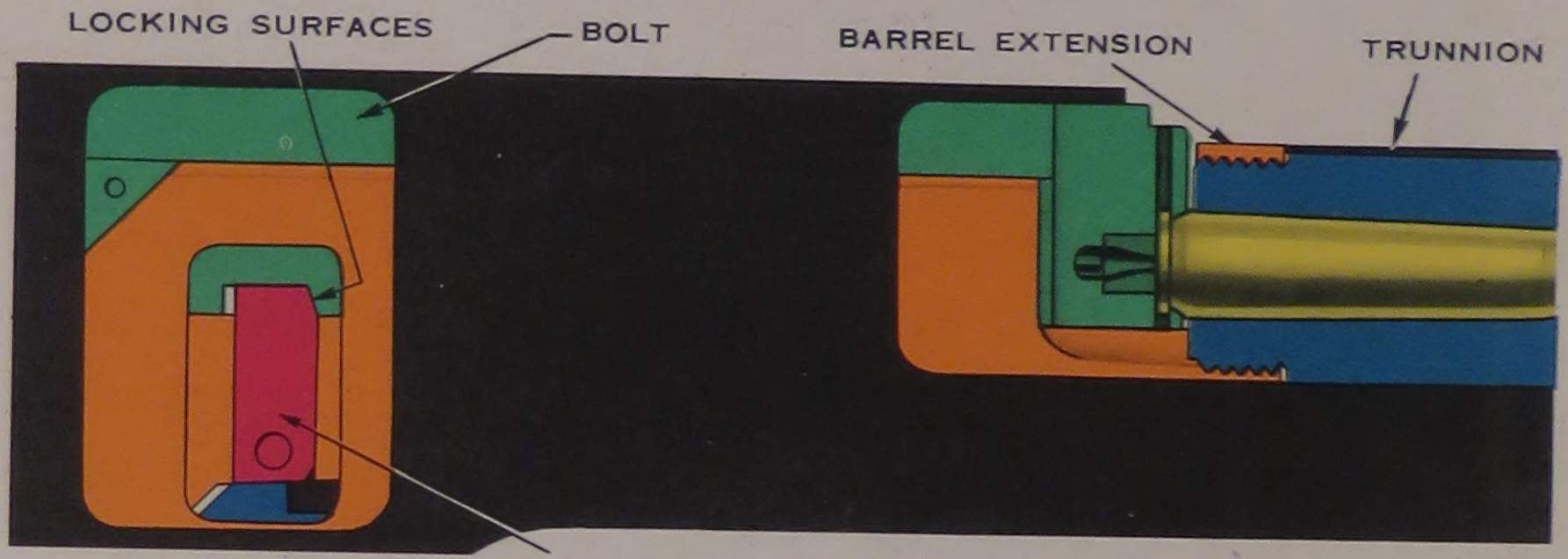

HEADSPACE
RECOIL PLATE
END OF BARREL

INTRODUCTION

The Browning Machine Gun, caliber .50, is a highly efficient automatic weapon built to precision standards. The very fact that its machined parts are fitted to close limits makes proper assembly and adjustment doubly important. The most important adjustment to insure proper functioning, and to prevent damage to certain vital parts, is proper headspacing. This adjustment must be made each time the gun is reassembled or each time another barrel is inserted. The following pages describe and illustrate "PROPER HEADSPACING."

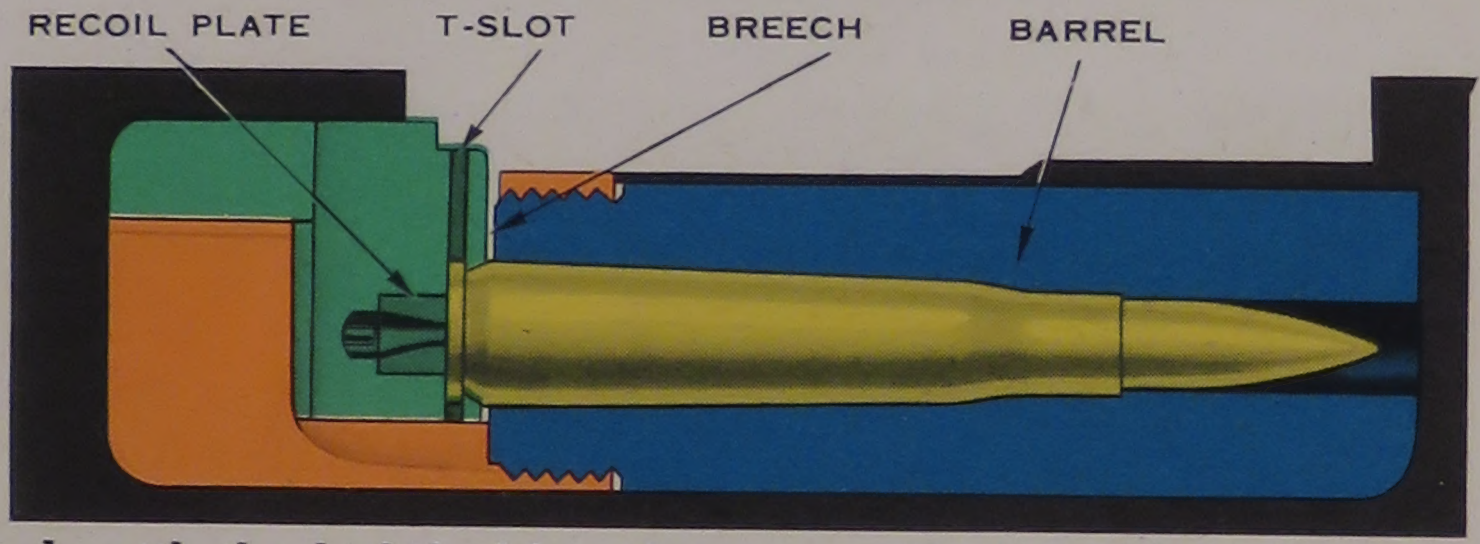
HEADSPACE SIGNIFICANCE



Before a machine gun is fired the headspace must be adjusted. This operation is divided into two parts. First, the bolt must be located along the barrel extension so that the locking surfaces at the front of the breech lock and bolt recess are firmly together.

The barrel extension at this time must be forward against the trunnion.

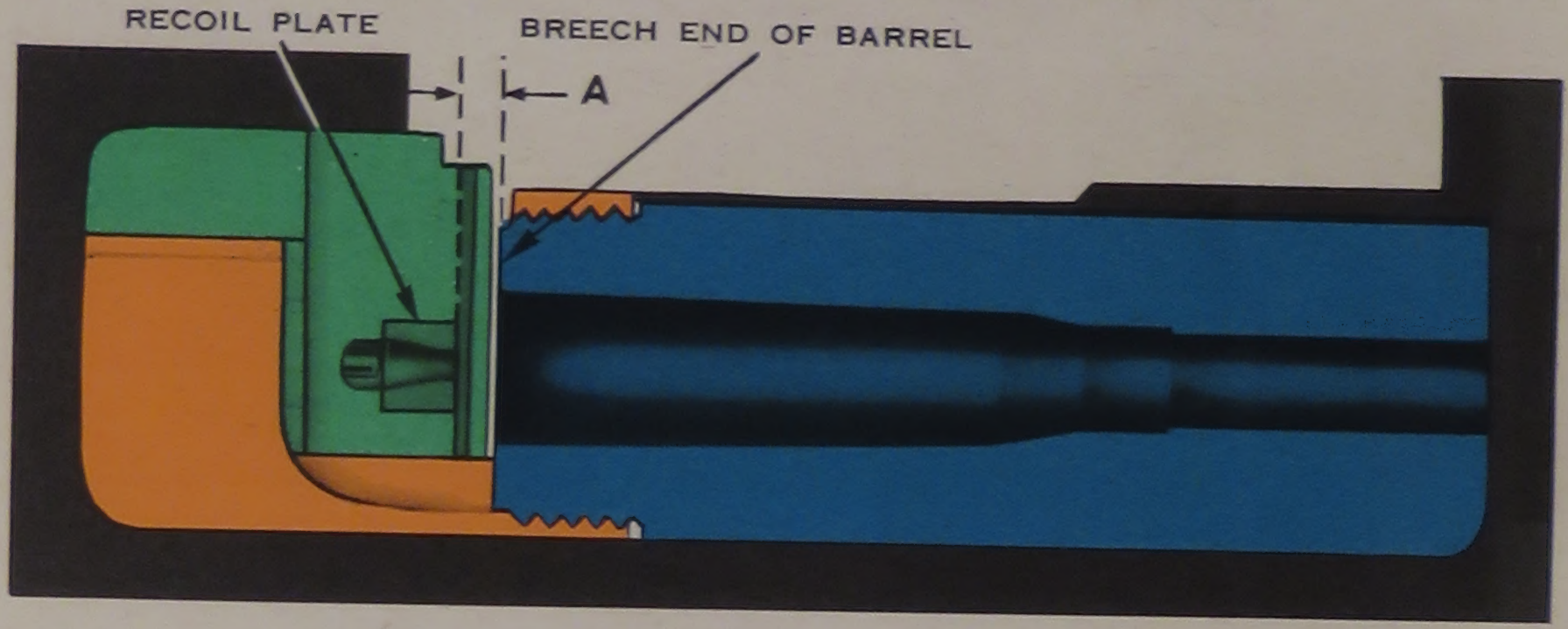
HEADSPACE SIGNIFICANCE



Second, with the bolt held in this correctly locked, battery position, the barrel must be so located that a cartridge held in the bolt T-slot against the recoil plate will fit ***snugly*** in the barrel chamber.

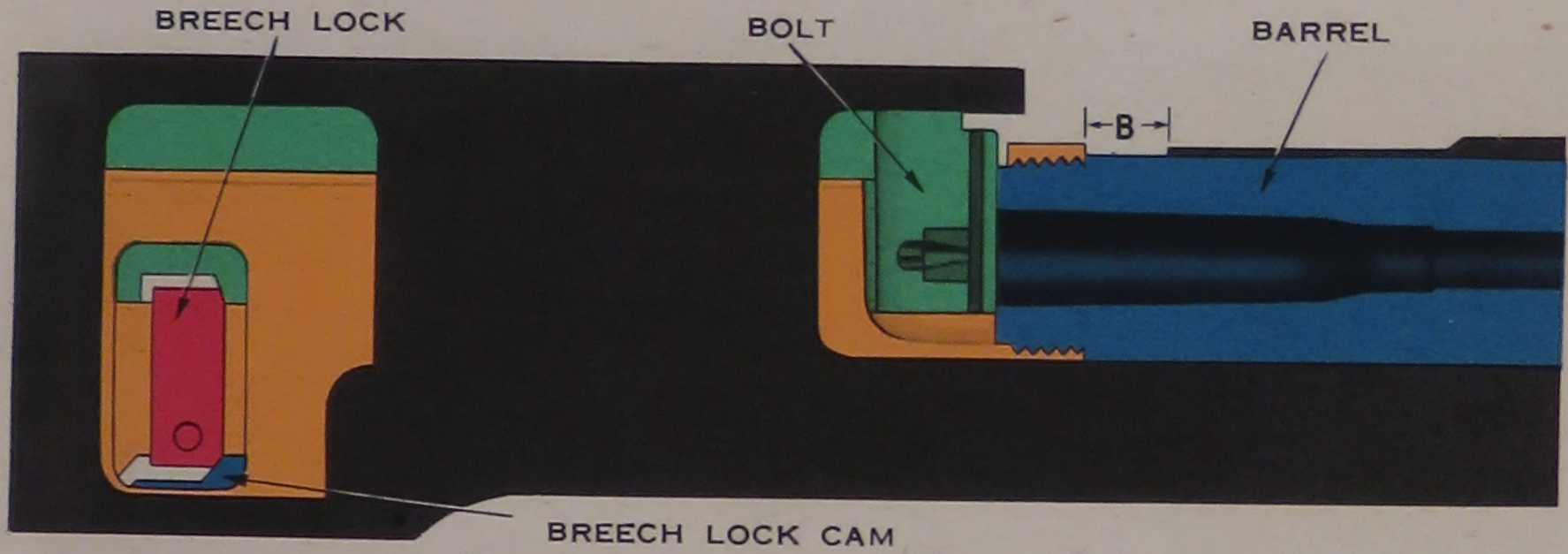
If these two steps have been accomplished, the bullet will be driven out of the muzzle with the maximum force since none of the powder pressure can escape at the breech of the barrel. When the parts of the gun have been thus adjusted the weapon is said to be correctly headspaced.

HEADSPACE SIGNIFICANCE



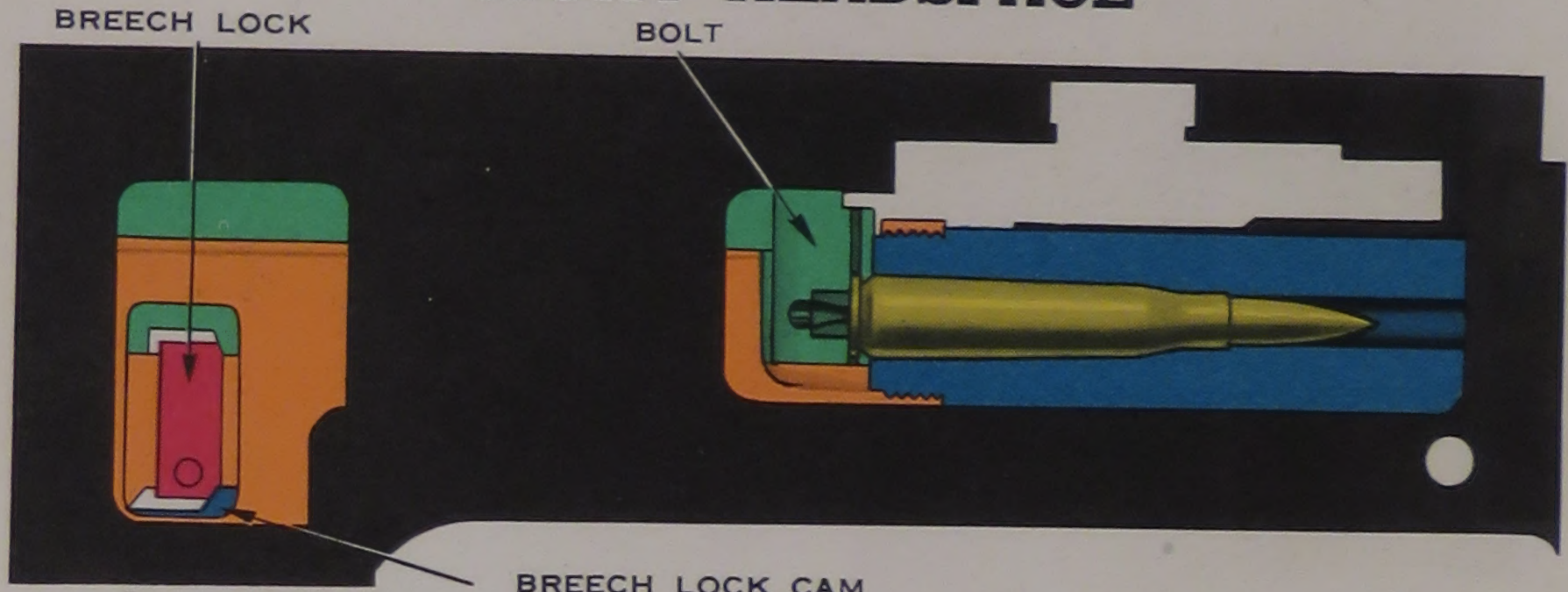
Precision manufacturing of related parts to standardized dimensions makes it possible to adjust and check the headspace without inserting a cartridge in the chamber. For checking purposes the distance between the recoil plate in the bolt and the breech end of the barrel as indicated at "A", is measured or gaged.

TIGHT HEADSPACE



Normally, the breech lock is forced upward by the breech lock cam. However, if in adjustment the bolt has been "jacked" too far rearward by the barrel, the breech lock cannot fully enter its recess in the bolt. As a result the breech lock cannot clear the cam, and the recoiling parts are held rearward out of battery position, as indicated by the separation at "B."

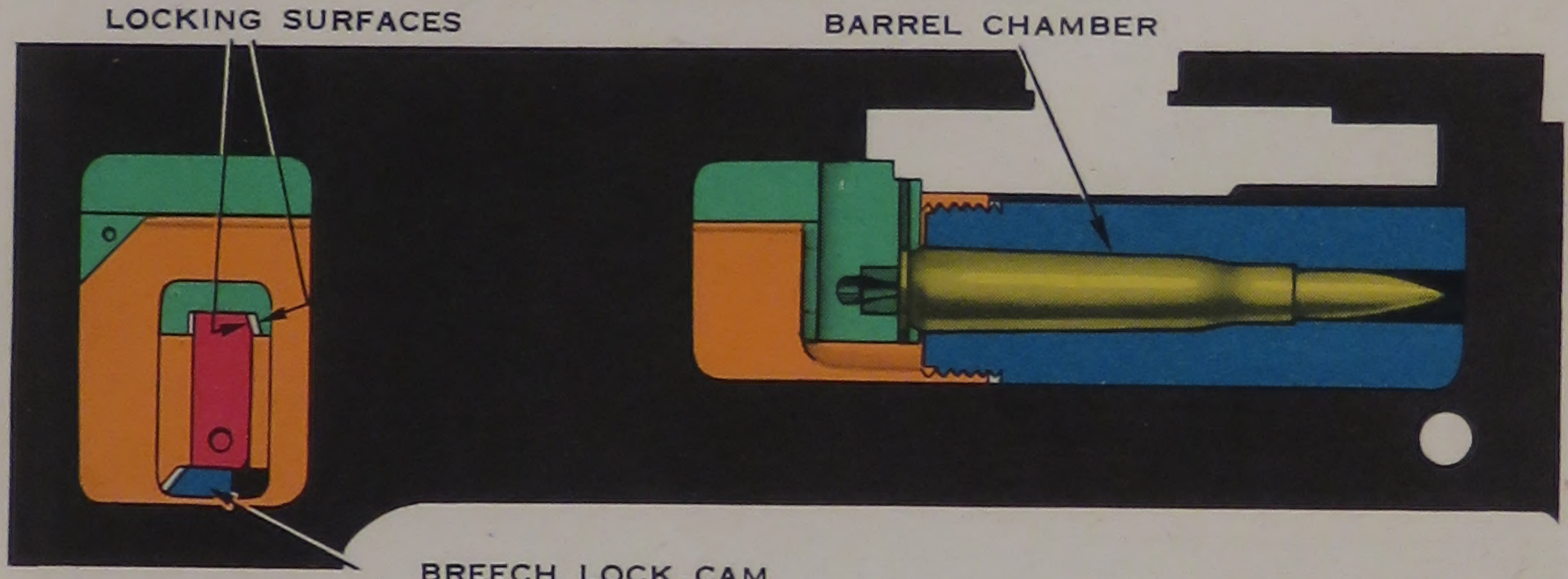
TIGHT HEADSPACE



If in adjustment the locking surfaces have been properly engaged but the barrel has not been positioned to provide room for a cartridge, such tight headspace may cause:

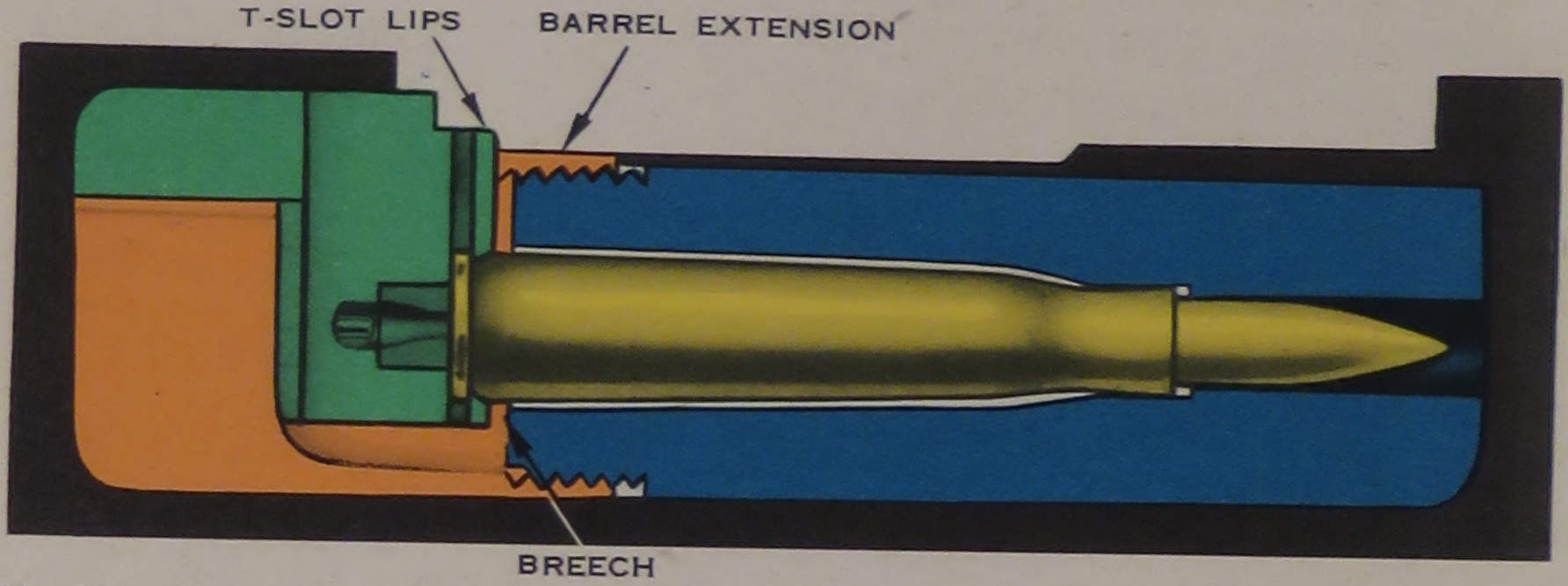
a. Failure to fire—the bolt may not go forward to firing position.
b. Failure to reach and thus extract the cartridge from the belt.
c. Sluggish action due to excess locking friction. (Most noticeable when pulling long ammunition belts.)

LOOSE HEADSPACE



If the parts have been improperly adjusted with too much headspace (barrel chamber too far away from the face of the bolt), the locking surfaces of the breech lock and bolt recess will not be in contact at the instant of firing. Loose headspace will cause the breech lock, locking recess, and breech lock cam to be badly battered, and will soon render these parts unfit for service.

LOOSE HEADSPACE



If the barrel is improperly adjusted an ***excessive*** distance from the bolt, not only will the locking surfaces become battered because of too much play, but the cartridge will not fit snugly in the chamber. Such improper adjustment may cause:

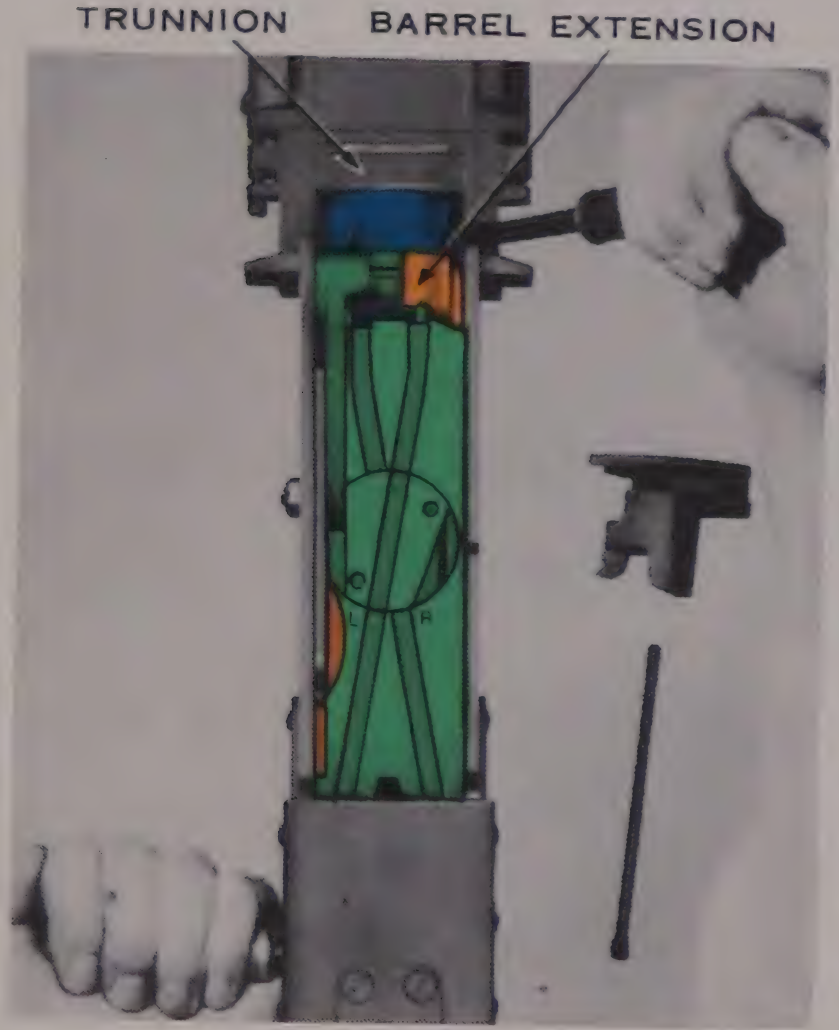
a. Ruptured or separated cases.
b. Poor shot patterns due to pressure leakage at the breech.
c. Battered T-slot lips and broken barrel extensions.

ADJUSTING HEADSPACE

Adjust the headspace each time the gun is assembled. The adjustment should be made *after* the parts have been assembled into the receiver, thus insuring positive location of the breech lock against its mating breech lock cam.

With headspace properly adjusted, the relationship of the parts of the gun is the same in all models. However, due to differences in design, the approved methods for adjusting and checking headspace are not the same for all models of the weapon. Pages 10 to 16 describe the approved method for the aircraft gun; pages 17 to 20 describe the method for the heavy barrel and water cooled models.

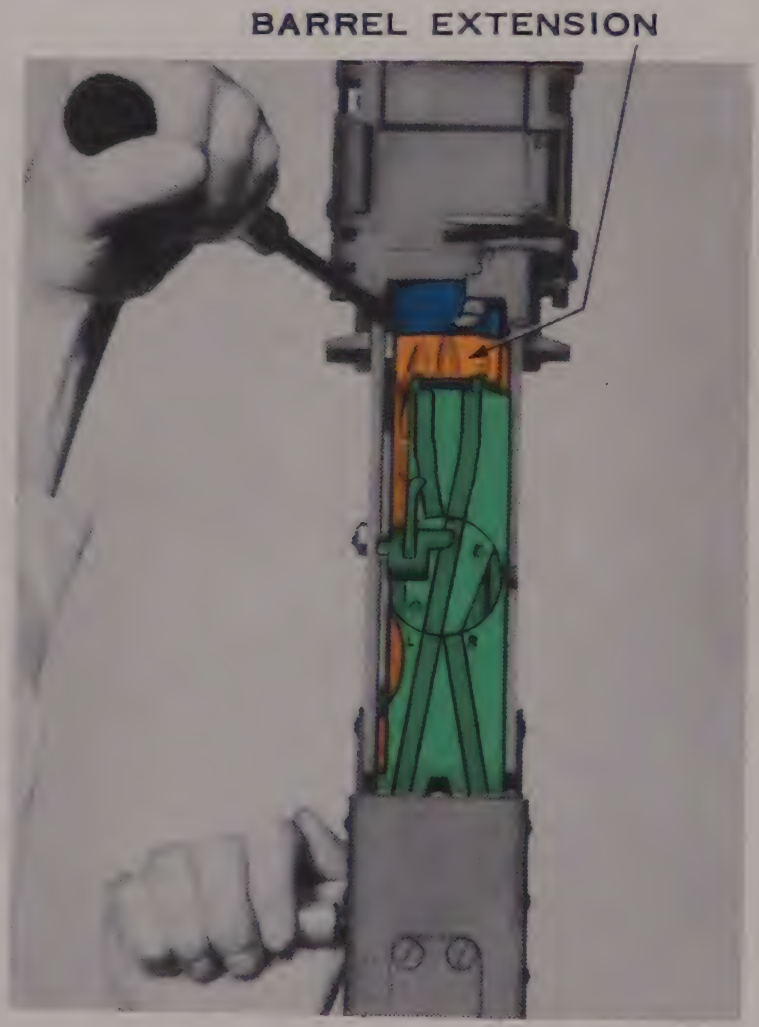
ADJUSTING HEADSPACE—Aircraft Gun



Retract the recoiling portion about one inch. As the parts are allowed to go forward ***slowly*** into battery, observe the contact between the barrel extension and trunnion. (If contact is ***not*** made, see page 11.)

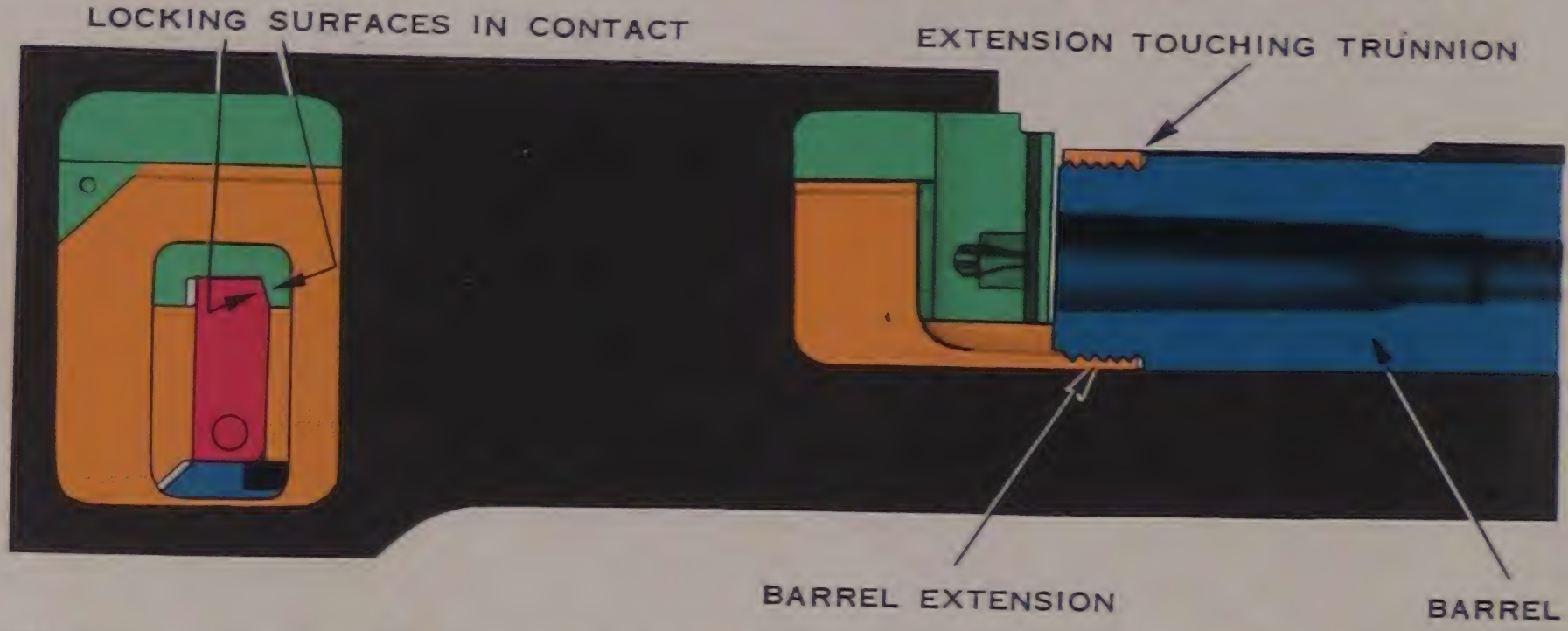
If the extension makes contact with the trunnion freely and easily, jack the bolt rearward by screwing the barrel into the barrel extension until, upon being allowed to go forward slowly, the parts will not reach the battery position.

ADJUSTING HEADSPACE—Aircraft Gun



Unscrew the barrel from the barrel extension, one notch at a time, until upon being allowed to go forward slowly the parts will just reach battery position without being forced. Caution: Do not retract the bolt more than one inch when determining the point at which the recoiling parts will just go into battery without being forced.

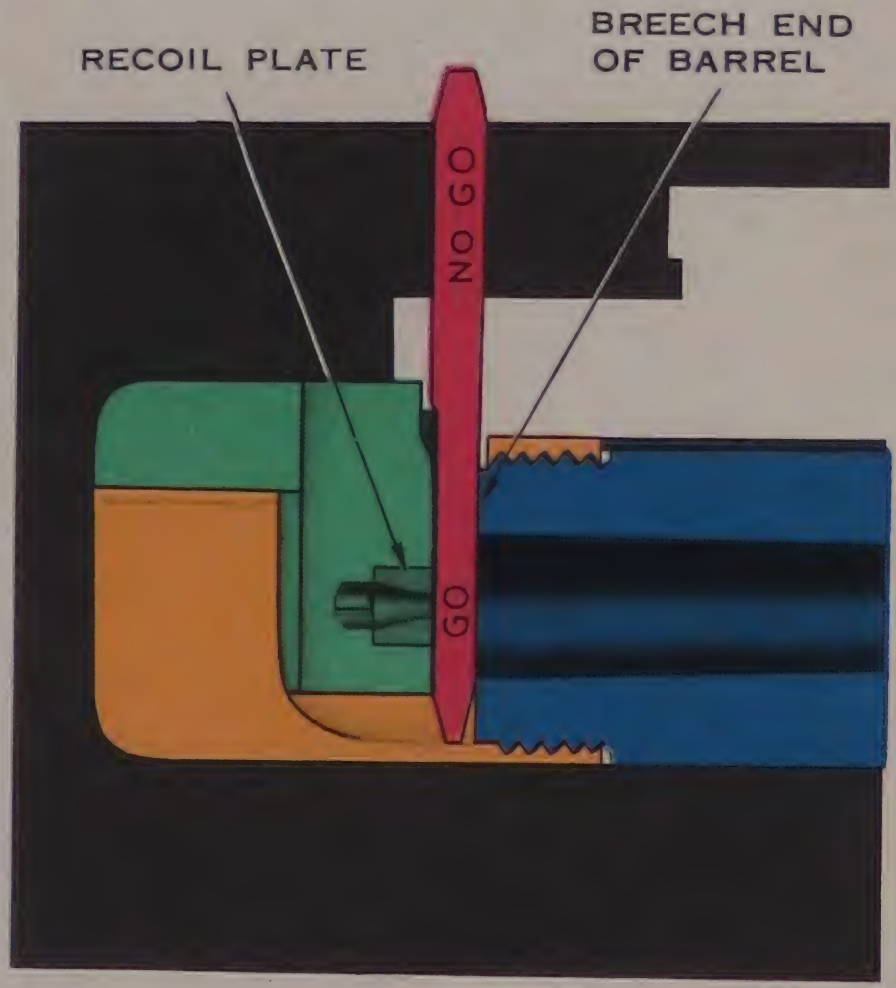
ADJUSTING HEADSPACE—Aircraft Gun



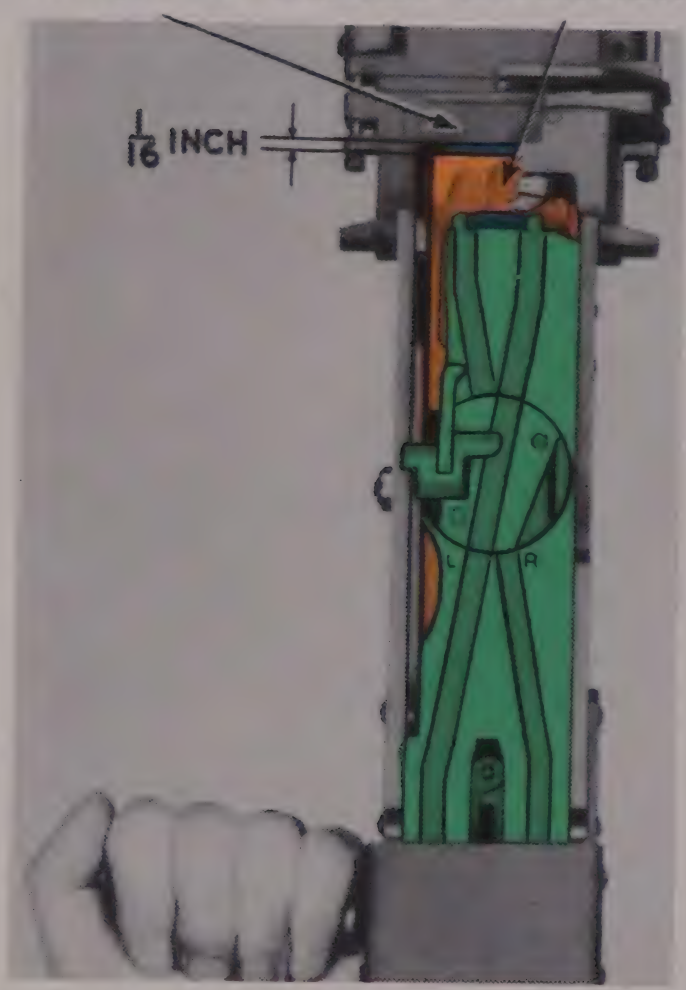
Then unscrew the barrel from the barrel extension ***two*** notches. This completes the adjustment of headspace, and provides just enough space for the cartridge when the gun is in operation; at the same time insuring that the locking surfaces will be firmly engaged at the instant of firing.

CHECKING HEADSPACE—Aircraft Gun

The correctness of the headspace adjustment of the *aircraft* gun may be quickly checked by using gage A351211. The gage is made with a thin end (GO), and a thicker end (NO GO). When the headspace is correctly adjusted, the distance between the recoil plate in the bolt and the breech end of the barrel shall equal or exceed the "GO" portion and it shall be less than the "NO GO" portion.



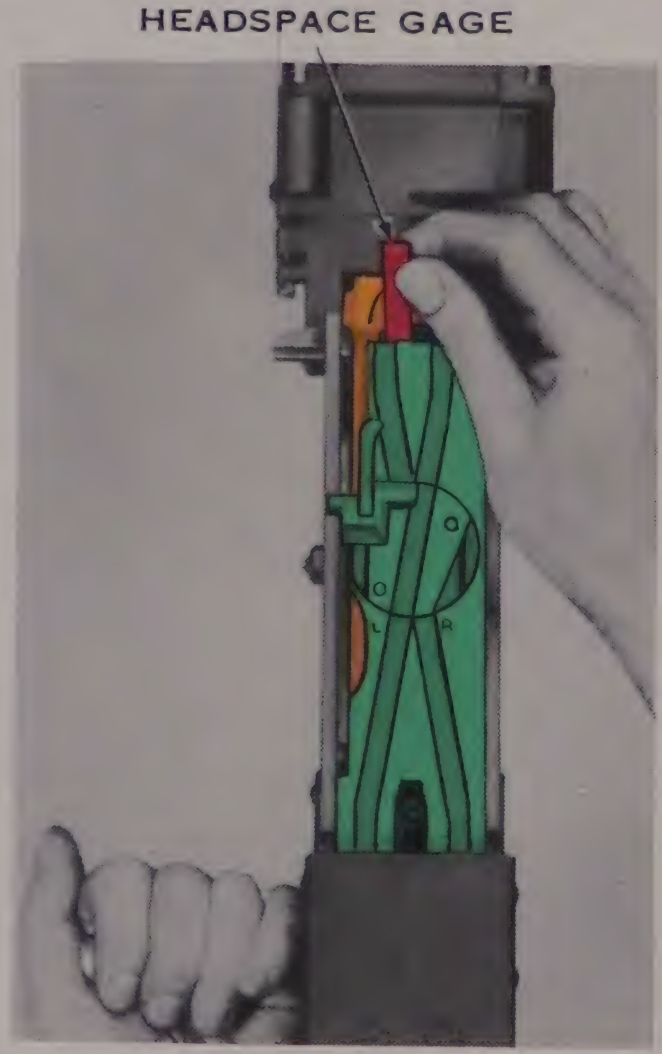
CHECKING HEADSPACE—Aircraft Gun



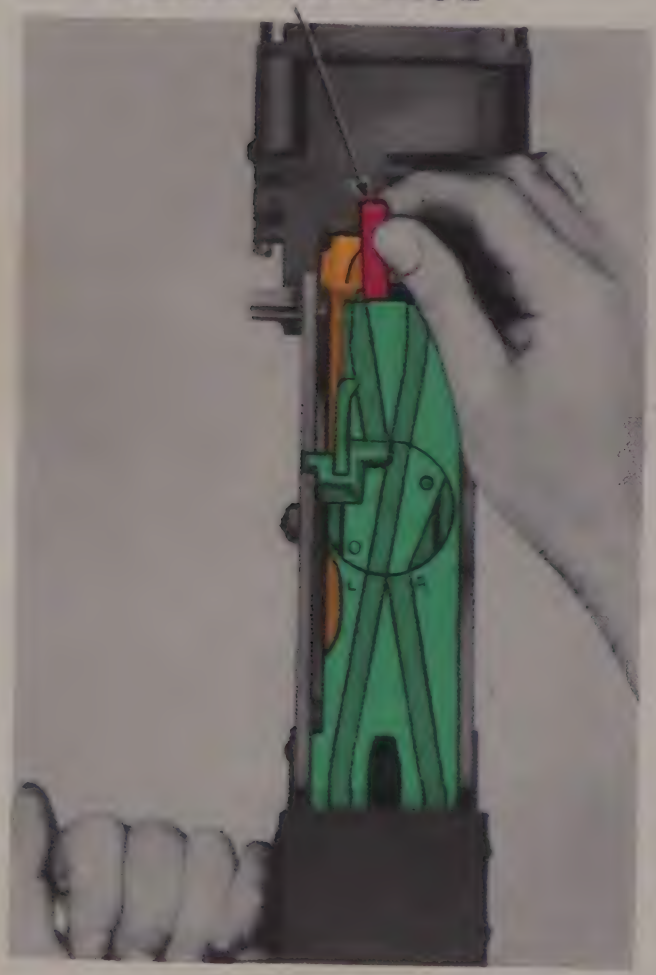
Cock the gun by fully retracting the recoiling portion and allowing it to return to battery position. This withdraws the firing pin. Be certain the end of the barrel projects rearward through the barrel extension. Retract the bolt until the barrel extension and trunnion are separated approximately 1/16 inch, and hold in this position while checking headspace. This puts the locking surfaces of the breech lock and bolt in contact, which is the position they should assume when a cartridge is chambered.

CHECK FOR TIGHTNESS—Aircraft Gun

Check the headspace for ***tightness*** by inserting the "GO" end in the T-slot between the face of the bolt and the end of the barrel. If the gage does not go in without being forced, the headspace is too tight; readjust by unscrewing the barrel one notch at a time, checking with the gage each time until it enters easily. Check for looseness in accordance with next page. CAUTION: Never release the firing pin with the gage in place—to do so may damage the pin.

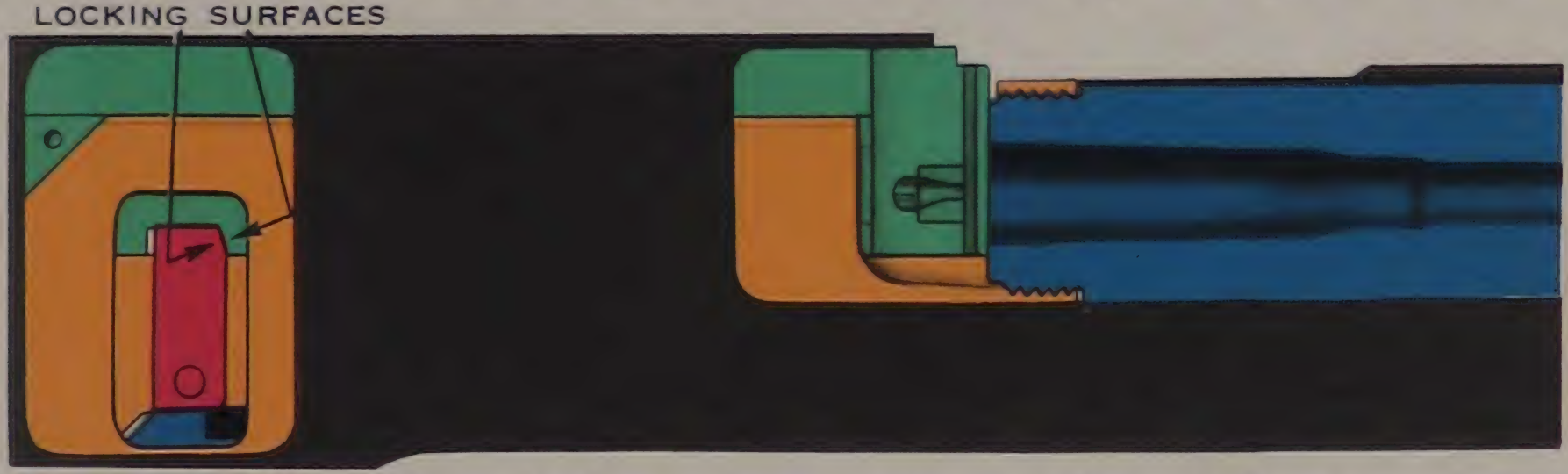


CHECK FOR LOOSENESS—Aircraft Gun



Check *looseness* by trying the NO GO end in the T-slot between the face of the bolt and the ***end of the barrel.*** If the gage does not enter, the headspace is correct providing the check for tightness is satisfactory. If the gage enters, the headspace is too loose; readjust by screwing the barrel in one notch at a time, checking with the gage each time, until it will not enter. Remove the gage, replace the rear right-hand cartridge stop assembly, and release the firing pin.

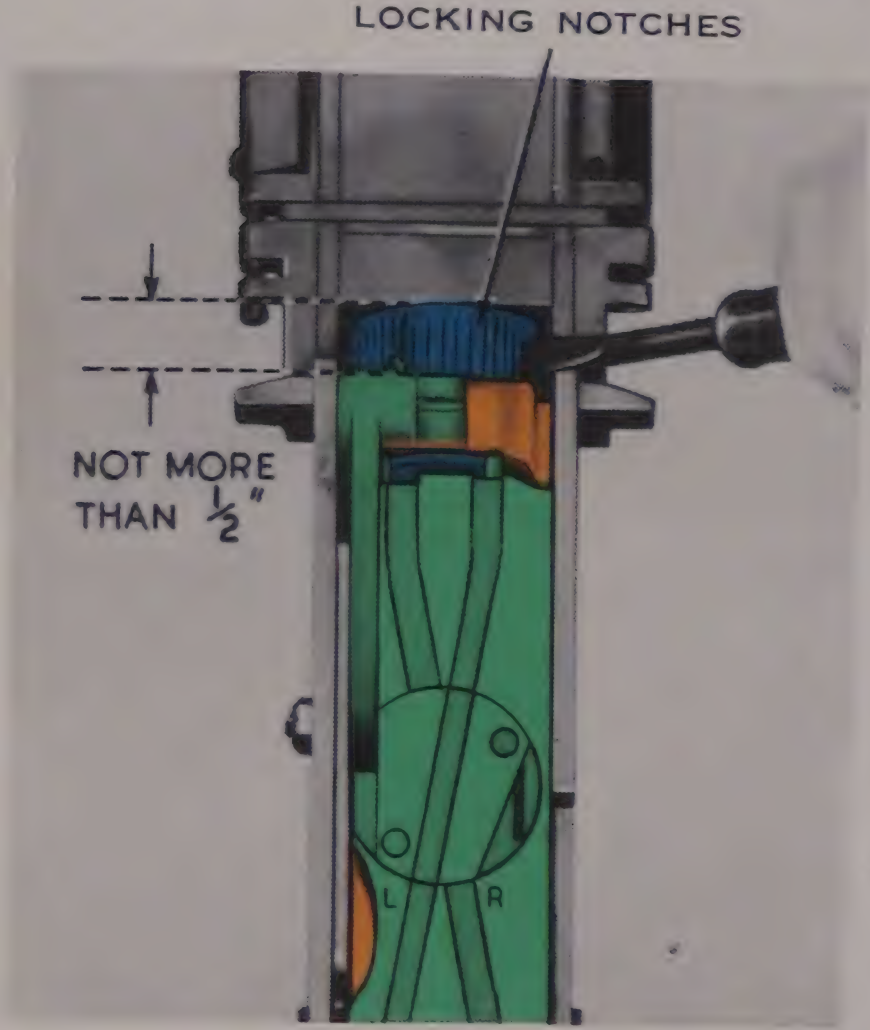
ADJUSTING HEADSPACE—Heavy Barrel Gun



Screw the barrel into the barrel extension until a ***definite resistance is felt.*** This will indicate that the barrel has forced the bolt rearward until the locking surfaces of the bolt and breech lock are in contact. Do not force the barrel beyond this point or an incorrect adjustment will be obtained.

Following this, ***unscrew*** the barrel ***two*** notches. If the gun operates sluggishly, then unscrew the barrel ***one*** additional notch. Adjustment may be checked per instructions on pages 19 and 20.

ADJUSTING HEADSPACE—Water Cooled Gun

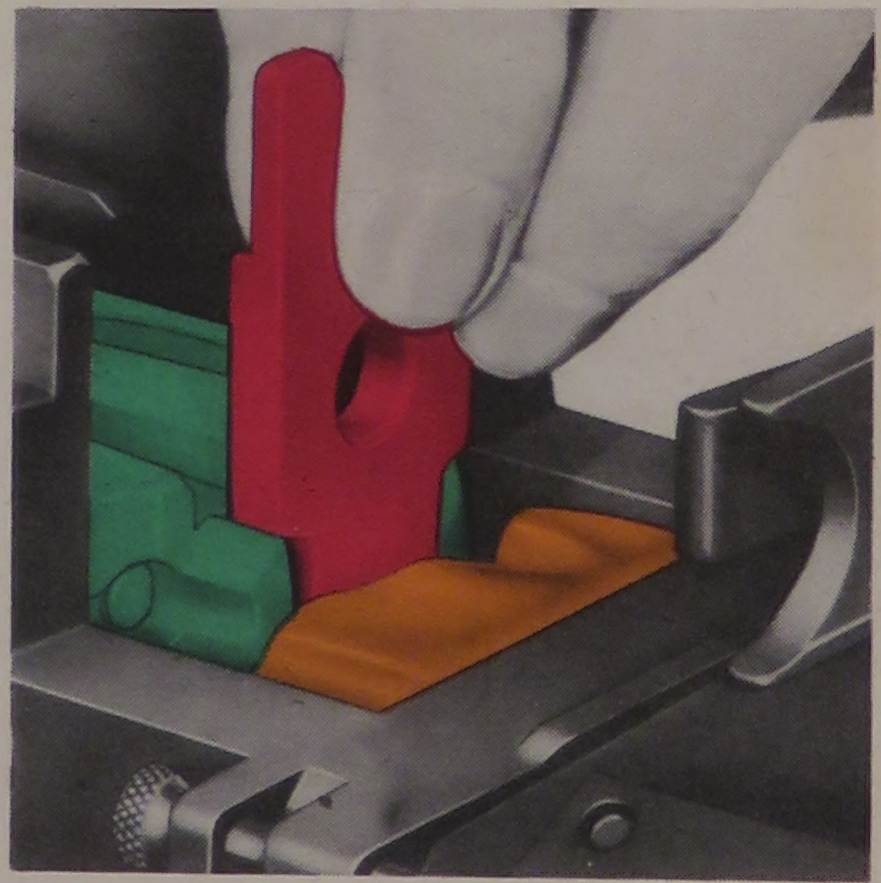


With the gun completely assembled, retract the recoiling portion ***only enough to expose the locking notches on the rear of the barrel.*** Engage the notches with a screwdriver and screw the barrel into the barrel extension ***until a definite resistance is felt.*** (See explanation on page 17.) Then unscrew the barrel ***two*** notches. Adjustment may be checked per instructions on pages 19 and 20.

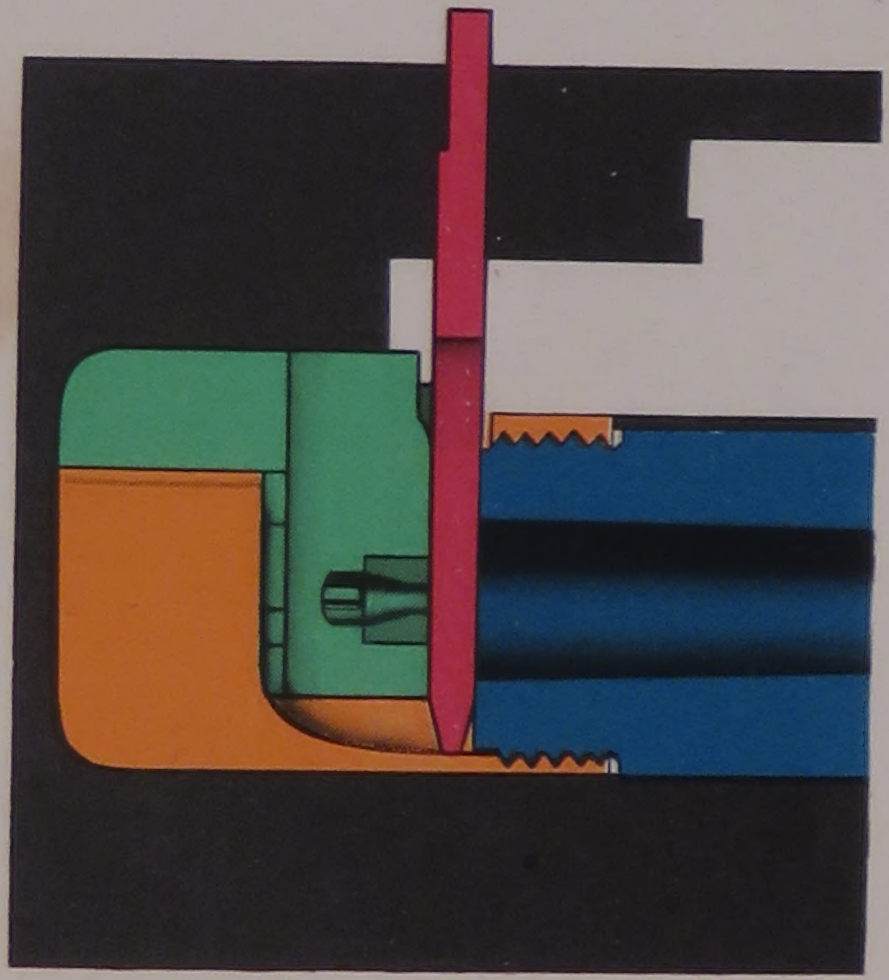
CHECKING HEADSPACE
Heavy Barrel and Water Cooled Gun

Retract the bolt slightly (not more than 1/16 inch) to relieve the driving spring pressure and to place the locking surfaces of the bolt and breech lock in contact.

Insert the headspace end of the combination gage, A196228, between the face of the bolt and the breech end of the barrel.



CHECKING HEADSPACE
Heavy Barrel and Water Cooled Gun



The gage should be entered its full length into the T-slot. If the gun is headspaced too tightly, it will not be possible to insert the gage. If such is the case, unscrew the barrel ***one notch at a time*** until the gage will just enter without being forced. Never release the firing pin with the gage in place.

ADDITIONAL COPIES

This booklet has been prepared by the AC Spark Plug Division and the Frigidaire Division of General Motors Corporation with the cooperation of the Ordnance Department. If is available to members of the United States armed forces who use the caliber .50 Browning Machine Gun.

Additional copies of this FGE booklet may be had in limited numbers by writing War Products Service Training Department, Frigidaire Division, General Motors Corporation, Dayton, Ohio.

Frig. Form G-780466 500M 10-43